

AMENDMENTS TO THE CLAIMS

Please cancel claims 1-6, 10-15, 19, 20, 50-54, 58-62, 66, 70-78, 82-92, 97-105, 109-114, 118, 119 without prejudice and amend claims 7, 16, 21, 55, 63, 67, 79, 93, 106, 115, and 120 as follows:

Claims 1-6. (Canceled)

7. (Currently Amended) A communication network according to claim 1, having a plurality of optical communication devices connected with each other, comprising:

uni-directional in-band control channels provided in every optical links leading from the output interfaces of one of adjoining first and second optical communication devices to the input interfaces of the other of the first and second optical communication devices, between the interfaces of the first and second optical communication devices along and for the every optical links; and

an out-band control channel provided between the first and second optical communication devices,

wherein the first and second optical communication devices include: control channel terminators for terminating the uni-directional in-band control channels and the out-band control channel; and optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators,

wherein the optical link controllers:

administer individual optical link attribute tables for specifying the attribute items of the optical links and their attribute values individually for the every optical links;

discover the attributes of the optical links by storing the individual optical link attribute tables in the control messages and exchanging them mutually, by comparing the attribute values for the every attribute items of the individual optical link attribute tables, and by collecting the common portions of the attribute values;

set up the optical links, of which the discovery of the attributes has failed, in an initial state;

set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

8. (Original) A communication network according to Claim 7, wherein the optical link attribute tables to be administered by the optical link controllers include a device No., an interface No., a wavelength, a signal rate and a signal format or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

9. (Original) A communication network according to Claim 7, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output device No., an output interface No., a wavelength, a signal rate, a signal format, an input device No., an input interface No., or physical characteristics of optical fibers constructing the optical links as the attribute items.

Claims 10-15. (Canceled).

16. (Currently Amended) A communication network according to claim 10, having a plurality of optical communication devices connected with each other, comprising:

a first uni-directional in-band control channel provided in every downstream optical links leading from the output interfaces of one of adjoining first and second optical communication devices to the input interfaces of the other of the first and second optical communication devices, between the interfaces of the first and second optical communication devices along and for the every downstream optical links; and

a second uni-directional in-band control channel provided in every upstream optical links leading from the output interfaces of the other of the first and second optical communication devices to the input interfaces of the one of the first and second optical communication devices, between the interfaces of the first and second optical communication devices along and for the every upstream optical links and directed in the direction opposite to the control channel in the downstream optical links,

wherein the first and second optical communication devices include: control channel terminators for terminating the first and second uni-directional in-band control channels, respectively; and optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators,

wherein the optical link controllers:

administer individual optical link attribute tables for specifying the attribute items of the optical links and their attribute values individually for the every optical links;

discover the attributes of the optical links by storing the individual optical link attribute tables in the control messages and exchanging them mutually, by comparing the attribute values for the every attribute items of the individual optical link attribute tables, and by collecting the common portions of the attribute values;

set up the optical links, of which the discovery of the attributes has failed, in an initial state;

set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

17.(Original) A communication network according to Claim 16, wherein the optical link attribute tables to be administered by the optical link controllers include a device No., an interface No., a wavelength, a signal rate and a signal format or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links

18. (Original) A communication network according to Claim 16, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output device No., an output interface No., a wavelength, a signal rate, a signal format, an input device No., an input interface No., or physical characteristics of optical fibers constructing the optical links as the attribute items.

Claims 19-20 (Cancelled).

21. (Currently Amended) A communication network according to claim 19, having a plurality of optical communication devices connected with each other, comprising:

a bi-directional in-band control channel provided in every optical links leading from the output interfaces of one of adjoining first and second optical communication devices to the input interfaces of the other of the first and second optical communication devices, between the interfaces of the first and second optical communication devices along and for the every optical links,

wherein the first and second optical communication devices include: a control channel terminator for terminating the bi-directional in-band control channels; and optical link

controllers for administering the every optical links by exchanging control messages through the control channel terminators,

wherein the optical link controllers:

administer individual optical link attribute tables for specifying the attribute items of the optical links and their attribute values individually for the every optical links;

discover the attributes of the optical links by storing the individual optical link attribute tables in the control messages and exchanging them mutually, by comparing the attribute values for the every attribute items of the individual optical link attribute tables, and by collecting the common portions of the attribute values;

set up the optical links, of which the discovery of the attributes has failed, in an initial state;

set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

22. (Original) A communication network according to Claim 21, wherein the optical link attribute tables to be administered by the optical link controllers include a device No., an interface No., a wavelength, a signal rate and a signal format or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

23.(Original) A communication network according to Claim 21, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output device No., an output interface No., a wavelength, a signal rate, a signal

format, an input device No., an input interface No., or physical characteristics of optical fibers constructing the optical links as the attribute items.

24. (Original) A communication network having a plurality of optical communication devices connected with each other through WDM transmission equipments, comprising:

a first uni-directional in-band control channel provided in every optical links leading from the output interfaces of one of first and second optical communication devices, which adjoin each other through an optical multiplex section including at least one set of opposed WDM transmission equipments and an arbitrary number of optical amplifiers between the opposed WDM transmission equipments, to the input interfaces of the other of the first and second optical communication devices through the optical multiplex section, between the interfaces of the first and second optical communication devices and the ports of the WDM transmission equipments connected with the interfaces, along and for the every optical links;

a second uni-directional in-band control channel provided in the optical multiplex section between the output ports of one of the opposed WDM transmission equipments and the input ports of the other, along the optical links;

and an out-band control channel provided between the first and second optical communication devices,

wherein the first and second optical communication devices include: control channel terminators for terminating the first uni-directional in-band control channels and the out-band control channel; and optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators, and

wherein the opposed WDM transmission equipments include; control channel terminators for terminating the first and second uni-directional in-band control channels; and

optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators.

25. (Original) A communication network according to claim 24, wherein at least one of the first and second optical communication devices is an optical switch equipment which is constructed to use a transparent optical switch.

26. (Original) A communication network according to claim 24, wherein: the signal wave band of the data channel on the optical links and the signal wave band of the uni-directional in-band control channels are different, and the interfaces of the first and second optical communication devices and the ports of the opposed WDM transmission equipments include WDM couplers for demultiplexing/multiplexing the two different wave bands in all the optical links.

27. (Original) A communication network according to claim 26, wherein in any of optical transmitters and optical receivers for transmitting control messages to the uni-directional in-band control channels, $1 \times N$ (N : a positive integer) optical switches connected with either one optical transmitter or one optical receiver are switched at a predetermined time interval to time-division share either the optical transmitter or the optical receiver among the N uni-directional control channels.

28. (Original) A communication network according to claim 24, wherein: the signal wave band of the data channel on the optical links and the signal wave band of the uni-directional in-band control channels are identical, the interfaces of the first and second optical communication devices and the ports of the opposed WDM transmission equipments include $1 \times$

2 optical switches provided in all optical links, and the optical links are employed as data channels during the data transmission and as control channels at other times by switching the 1 x 2 optical switches.

29. (Original) A communication network according to claim 28, wherein in any of optical transmitters and optical receivers for transmitting control messages to the uni-directional in-band control channels, 1 x N (N: a positive integer) optical switches connected with either one optical transmitter or one optical receiver are switched at a predetermined time interval to time-division share either the optical transmitter or the optical receiver among the N uni-directional control channels.

30. (Original) A communication network according to claim 24,
wherein the individual optical link controllers of the first and second optical communication devices and the opposed WDM transmission equipments:
administer individual optical link attribute tables for specifying the attribute items of the optical links and their attribute values individually for the every optical links;
discover the attributes of the optical links by storing the individual optical link attribute tables in the control messages and exchanging them mutually, by comparing the attribute values for the every attribute items of the individual optical link attribute tables, and by collecting the common portions of the attribute values;
set up the optical links, of which the discovery of the attributes has failed, in an initial state;
set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state, thereby to perform the state administrations for the every optical links.

31. (Original) A communication network according to claim 30, wherein the optical link attribute tables to be administered by the optical link controllers on the first and second optical communication devices include an optical switch equipment No., an interface No., a wavelength, a signal rate, a signal format, a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

32. (Original) A communication network according to claim 30, wherein the optical link attribute tables to be administered by the optical link controllers on the WDM transmission equipments include a wavelength, a signal rate, a signal format, an optical multiplex section group No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

33. (Original) A communication network according to claim 30, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output optical switch equipment No., an output interface No., a wavelength, a signal rate, a signal format, an optical multiplex section group No., an input optical switch equipment No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items.

34. (Original) A communication network having a plurality of optical communication devices connected with each other through WDM transmission equipments, comprising:

a first uni-directional in-band control channel provided in every downstream optical links leading from the output interfaces of one of first and second optical communication devices, which adjoin each other through an optical multiplex section including at least one set of opposed WDM transmission equipments for transmitting downstream and upstream signals individually and an arbitrary number of optical amplifiers between the opposed WDM transmission equipments, to the input interfaces of the other of the first and second optical communication devices through the optical multiplex section, between the interfaces of the first and second optical communication devices and the ports of the WDM transmission equipments connected with the interfaces, along and for the every downstream optical links,

a second uni-directional in-band control channel provided in the optical multiplex section between the output ports of one of the opposed WDM transmission equipments for transmitting the downstream signals and the input ports of the other, along the downstream optical links;

a third uni-directional in-band control channel provided in every upstream optical links leading from the output interfaces of the other optical communication device of the first and second optical communication devices through the optical multiplex section to the input interfaces of the one optical communication device of the first and second optical communication devices, between the interfaces of the first and second optical communication devices and the ports of the WDM transmission equipment connected with the interfaces, along and for the every upstream downstream optical links and directed in the direction opposite to the control channels in the downstream optical links; and

a fourth uni-directional in-band control channel provided in the optical multiplex section between the output ports of one of the opposed WDM transmission equipments for

transmitting the upstream signals and the input ports of the other and directed in the direction opposite to the control channels in the downstream optical links, along the upstream optical links, wherein the first and second optical communication devices include: control channel terminators for terminating the first and third uni-directional in-band control channels; and optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators,

wherein the opposed WDM transmission equipments for transmitting the downstream signals include: control channel terminators for terminating the first and second uni-directional in-band control channels; and optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators, and

wherein the opposed WDM transmission equipments for transmitting the upstream signals include: control channel terminators for terminating the third and fourth uni-directional in-band control channels; and optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators.

35. (Original) A communication network according to claim 34, wherein at least one of the first and second optical communication devices is an optical switch equipment which is constructed to use a transparent optical switch.

36. (Original) A communication network according to claim 34, wherein: the signal wave band of the data channel on the optical links and the signal wave band of the uni-directional in-band control channels are different, and the interfaces of the first and second optical communication devices and the ports of the opposed WDM transmission equipments include WDM couplers for demultiplexing/multiplexing the two different wave bands in all the optical links.

37. (Original) A communication network according to claim 36, wherein in any of optical transmitters and optical receivers for transmitting control messages to the uni-directional in-band control channels, $1 \times N$ (N : a positive integer) optical switches connected with either one optical transmitter or one optical receiver are switched at a predetermined time interval to time-division share either the optical transmitter or the optical receiver among the N uni-directional control channels.

38. (Original) A communication network according to claim 34, wherein: the signal wave band of the data channel on the optical links and the signal wave band of the uni-directional in-band control channels are identical, the interfaces of the first and second optical communication devices and the ports of the opposed WDM transmission equipments include 1×2 optical switches provided in all optical links, and the optical links are employed as data channels during the data transmission and as control channels at other times by switching the 1×2 optical switches.

39. (Original) A communication network according to claim 38, wherein in any of optical transmitters and optical receivers for transmitting control messages to the uni-directional in-band control channels, $1 \times N$ (N : a positive integer) optical switches connected with either one optical transmitter or one optical receiver are switched at a predetermined time interval to time-division share either the optical transmitter or the optical receiver among the N uni-directional control channels.

40. (Original) A communication network according to claim 34, wherein the individual optical link controllers of the first and second optical communication devices and the opposed WDM transmission equipments: administer individual optical link attribute tables for specifying the attribute items of the optical links and their attribute values individually for the

every optical links; discover the attributes of the optical links by storing the individual optical link attribute tables in the control messages and exchanging them mutually, by comparing the attribute values for the every attribute items of the individual optical link attribute tables, and by collecting the common portions of the attribute values; set up the optical links, of which the discovery of the attributes has failed, in an initial state; set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state, thereby to perform the state administrations for the every optical links.

41. (Original) A communication network according to claim 40, wherein the optical link attribute tables to be administered by the optical link controllers on the first and second optical communication devices include at least an optical switch equipment No., an interface No., a wavelength, a signal rate, a signal format, a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

42. (Original) A communication network according to claim 40, wherein: the optical link attribute tables to be administered by the optical link controllers on the WDM transmission equipments include at least a wavelength, a signal rate, a signal format and an optical multiplex section group No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

43. (Original) A communication network according to claim 40, wherein the attributes of the optical links, which have been discovered by collecting the common portions of

the attribute items of the optical link attribute tables administered by the optical link controllers, include an output optical switch equipment No., an output interface No., a wavelength, a signal rate, a signal format, an optical multiplex section group No., an input optical switch equipment No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items.

44. (Original) A communication network having a plurality of optical communication devices connected with each other through WDM transmission equipments, comprising:

a first bi-directional in-band control channel provided in every optical links leading from the output interfaces of one optical communication device of first and second optical communication devices, which adjoin each other through an optical multiplex section including at least one set of opposed WDM transmission equipments and an arbitrary number of optical amplifiers between the opposed WDM transmission equipments, to the input interfaces of the other optical communication device of the first and second optical communication devices through the optical multiplex section, between the interfaces of the first and second optical communication devices and the ports of the WDM transmission equipments connected with the interfaces, along and for the every optical links; and

a second bi-directional in-band control channel provided in the optical multiplex section between the output ports of one of the opposed WDM transmission equipments and the input ports of the other, along the optical links,

wherein the first and second optical communication devices include: control channel terminators for terminating the first bi-directional in-band control channel; and optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators, and

wherein the opposed WDM transmission equipments include: control channel terminators for terminating the first and second bi-directional in-band control channels; and optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators.

45. (Original) A communication network according to claim 44, wherein at least one of the first and second optical communication devices is an optical switch equipment which is constructed to use a transparent optical switch.

46. (Original) A communication network according to claim 44,

wherein the individual optical link controllers of the first and second optical communication devices and the opposed WDM transmission equipments:

administer individual optical link attribute tables for specifying the attribute items of the optical links and their attribute values individually for the every optical links;

discover the attributes of the optical links by storing the individual optical link attribute tables in the control messages and exchanging them mutually, by comparing the attribute values for the every attribute items of the individual optical link attribute tables, and by collecting the common portions of the attribute values;

set up the optical links, of which the discovery of the attributes has failed, in an initial state;

set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state, thereby to perform the state administrations for the every optical links.

47. (Original) A communication network according to Claim 46, wherein the optical link attribute tables to be administered by the optical link controllers on the first and second optical communication devices include at least an optical switch equipment No., an interface No., a wavelength, a signal rate and a signal format, a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

48. (Original) A communication network according to Claim 46, wherein the optical link attribute tables to be administered by the optical link controllers on the WDM transmission equipments include at least a wavelength, a signal rate, a signal format and an optical multiplex section group No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

49.(Original) A communication network according to Claim 46, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output optical switch equipment No., an output interface No., a wavelength, a signal rate, a signal format, an optical multiplex section group No., an input optical switch equipment No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items.

Claims 50-54 (Canceled).

55. (Currently Amended) A WDM transmission equipment according to claim 50, for forming an optical multiplex section together with opposed devices and an arbitrary number of optical amplifiers between the opposed devices, comprising:

a uni-directional in-band control channel provided in the optical multiplex section between the input/output ports of the opposed devices and along all optical links through the optical multiplex section;

a control channel terminator for terminating the uni-directional in-band control channel; and

optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators,

wherein the optical link controllers:

administer individual optical link attribute tables for specifying the attribute items of the optical links and their attribute values for the every optical links;

discover the attributes of the optical links by storing the individual optical link attribute tables in the control messages and exchanging them mutually, by comparing the attribute values for the every attribute items of the individual optical link attribute tables, and by collecting the common portions of the attribute values;

set up the optical links, of which the discovery of the attributes has failed, in an initial state;

set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

56.(Original) A WDM transmission equipment according to Claim 55,

wherein the optical link attribute tables to be administered by the optical link controllers include at least a wavelength, a signal rate, a signal format and an optical multiplex section group No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

57.(Original) A WDM transmission equipment according to Claim 55, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output optical switch equipment No., an output interface No., a wavelength, a signal rate, a signal format, an optical multiplex section group No., an input optical switch equipment No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items.

Claims 58-62 (Canceled).

63.(Currently Amended) A WDM transmission equipment according to claim 58, for forming an optical multiplex section together with opposed devices for transmitting downstream and upstream signals, respectively, and an arbitrary number of optical amplifiers between the opposed devices, comprising:

a first uni-directional in-band control channel provided in the optical multiplex section between the input/output ports of the opposed devices and along all downstream optical links through the optical multiplex section;

a second uni-directional in-band control channel provided in the optical multiplex section between the input/output ports of the opposed devices and along all upstream optical links through the optical multiplex section and directed in the direction opposite to the control channels in the downstream optical links;

a control channel terminator for terminating the first and second uni-directional in-band control channel; and

optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators,

wherein the optical link controllers:

administer individual optical link attribute tables for specifying the attribute items of the optical links and their attribute values for the every optical links;

discover the attributes of the optical links by storing the individual optical link attribute tables in the control messages and exchanging them mutually, by comparing the attribute values for the every attribute items of the individual optical link attribute tables, and by collecting the common portions of the attribute values;

set up the optical links, of which the discovery of the attributes has failed, in an initial state;

set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

64.(Original) A WDM transmission equipment according to Claim 63, wherein the optical link attribute tables to be administered by the optical link controllers include at least a

wavelength, a signal rate, a signal format and an optical multiplex section group No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

65.(Original) A WDM transmission equipment according to Claim 63, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output optical switch equipment No., an output interface No., a wavelength, a signal rate, a signal format, an optical multiplex section group No., an input optical switch equipment No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items.

66.(Canceled).

67. (Currently Amended) A WDM transmission equipment according to claim 66, for forming an optical multiplex section together with opposed devices and an arbitrary number of optical amplifiers between the opposed devices, comprising:

a bi-directional in-band control channel provided in the optical multiplex section between the input/output ports of the opposed devices and along all optical links through the optical multiplex section;

a control channel terminator for terminating the bi-directional in-band control channel; and

optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators,

wherein the optical link controllers:

administer individual optical link attribute tables for specifying the attribute items of the optical links and their attribute values for the every optical links;

discover the attributes of the optical links by storing the individual optical link attribute tables in the control messages and exchanging them mutually, by comparing the attribute values for the every attribute items of the individual optical link attribute tables, and by collecting the common portions of the attribute values;

set up the optical links, of which the discovery of the attributes has failed, in an initial state;

set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

68.(Original) A WDM transmission equipment according to Claim 67, wherein the optical link attribute tables to be administered by the optical link controllers include at least a wavelength, a signal rate, a signal format and an optical multiplex section group No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

69.(Original) A WDM transmission equipment according to Claim 67, wherein the attributes of the optical links, which have been discovered by collecting the common

portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output optical switch equipment No., an output interface No., a wavelength, a signal rate, a signal format, an optical multiplex section group No., an input optical switch equipment No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items.

Claims 70-78 (Canceled).

79.(Currently Amended) An optical link attribute/state administering administrating method according to claim 70, for a communication network having a plurality of optical communication devices connected with each other, comprising:

defining an optical link section leading from the output interfaces of a first optical communication device of a transmission source to the input interfaces of an adjoining second optical communication device;

providing in-band control channels for every optical links between the first and second optical communication devices; and

exchanging the optical link attributes, as specified by the interfaces of the first and second optical communication devices, as control messages through the in-band control channels,

wherein the optical link controllers:

administer individual optical link attribute tables for specifying the attribute items of the optical links and their attribute values individually for the every optical links;

discover the attributes of the optical links by storing the individual optical link attribute tables in the control messages and exchanging them mutually, by comparing the attribute values for the every attribute items of the individual optical link attribute tables, and by collecting the common portions of the attribute values;

set up the optical links, of which the discovery of the attributes has failed, in an initial state;

set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

80.(Original) A communication network according to Claim 79, wherein the optical link attribute tables to be administered by the optical link controllers include a device No., an interface No., a wavelength, a signal rate and a signal format or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

81.(Original) An optical link attribute/state administering method according to Claim 79, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output device No., an output interface No., a wavelength, a signal rate, a signal format, an input device No., an input interface No., or physical characteristics of optical fibers constructing the optical links as the attribute items.

Claims 82-92 (Canceled).

93.(Currently Amended) An optical link attribute/state administering
administrating method according to claim 82, for a communication network having a plurality of
optical communication devices connected with each other through a WDM transmission
equipment, comprising:

defining an optical link section leading from the output interfaces of a first optical
communication device of a transmission source to the input interfaces of an adjoining second
optical communication device;

providing in-band control channels for every optical links along optical links
between the first and second optical communication devices and an optical multiplex section;
and

exchanging the optical link attributes, as specified by the interfaces of the first
and second optical communication devices, and the optical link attributes, as specified by the
optical multiplex section, as control messages through the in-band control channels,

wherein the optical link controllers of the first and second optical communication
devices and [[the]] opposed WDM transmission equipments:

administer individual optical link attribute tables for specifying the attribute items
of the optical links and their attribute values individually for the every optical links;

discover the attributes of the optical links by storing the individual optical link
attribute tables in the control messages and exchanging them mutually, by comparing the
attribute values for the every attribute items of the individual optical link attribute tables, and by
collecting the common portions of the attribute values;

set up the optical links, of which the discovery of the attributes has failed, in an
initial state;

set up the optical links, of which the discovery of the attributes has succeeded, in an usable state; and

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

94. (Original) An optical link attribute/state administering method according to Claim 93, wherein the optical link attribute tables to be administered by the optical link controllers on the first and second optical communication devices include at least an optical switch equipment No., an interface No., a wavelength, a signal rate, a signal format, a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

95.(Original) An optical link attribute/state administering method according to Claim 93, wherein:

the optical link attribute tables to be administered by the optical link controllers on the WDM transmission equipment include at least a wavelength, a signal rate, a signal format and an optical multiplex section group No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

96.(Original) An optical link attribute/state administering method according to Claim 93, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the

optical link controllers, include an output optical switch equipment No., an output interface No., a wavelength, a signal rate, a signal format, an optical multiplex section group No., an input optical switch equipment No., a distance between the opposed WDM transmission equipments in the optical multiplex section or physical characteristics of optical fibers constructing the optical links as the attribute items.

Claims 97-105 (Canceled).

106.(Currently Amended) An optical switch equipment according to claim 104, connected with adjoining optical communication device, comprising:

uni-directional in-band control channels provided in every optical links leading from output interfaces to the input interfaces of the adjoining optical communication devices, between the interfaces of the adjoining optical communication devices for the every optical links;

an out-band control channel provided between the adjoining optical communication devices;

control channel terminators for terminating a uni-directional in-band control channel and an out-band control channel; and

optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators,

wherein the signal wave band of the data channel on the optical links and the signal wave band of the uni-directional in-band control channels are identical,

wherein the interfaces of the adjoining optical communication devices include 1 x 2 optical switches provided in all optical links, and

wherein the optical links are employed as data channels during the data transmission and as control channels at other times by switching the 1 x 2 optical switches,

wherein the optical link controllers:

administer optical link attribute tables for specifying the attribute items of the optical links and their attribute values for the every optical links;

exchange the optical link attribute tables with one of the adjoining optical communication devices and the adjoining optical switch equipments;

compare the attribute values for the every attribute items of the optical link attribute tables;

discover the attributes of the optical links by collecting the common portions of the attribute values;

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

107.(Original) An optical switch equipment according to Claim 106, wherein the optical link attribute tables to be administered by the optical link controllers include a device No., an interface No., a wavelength, a signal rate and a signal format or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

108.(Original) An optical switch equipment according to Claim 106, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output device No., an output interface No., a wavelength, a signal rate, a signal

format, an input device No., an input interface No., or physical characteristics of optical fibers constructing the optical links as the attribute items.

Claims 109-114 (Canceled).

115.(Currently Amended) An optical switch equipment according to claim 109, connected with adjoining optical communication device, comprising:

a first uni-directional in-band control channel provided in every downstream optical links leading from output interfaces to the input interfaces of the adjoining optical communication devices, between the interfaces of the adjoining optical communication devices for the every downstream optical links;

a second uni-directional in-band control channel provided in every upstream optical links leading from the output interfaces of the adjoining optical communication devices to the input interfaces of the own device, between the interfaces of the adjoining optical communication devices for the every upstream optical links and directed in the direction opposite to the control channel in the downstream optical links;

control channel terminators for terminating the first and second uni-directional in-band control channels; and

optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators,

wherein the optical link controllers:

administer optical link attribute tables for specifying the attribute items of the optical links and their attribute values for the every optical links;

exchange the optical link attribute tables with one of the adjoining optical communication devices and the adjoining optical switch equipments;

compare the attribute values for the every attribute items of the optical link attribute tables;

discover the attributes of the optical links by collecting the common portions of the attribute values;

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

116.(Original) An optical switch equipment according to Claim 115, wherein the optical link attribute tables to be administered by the optical link controllers include a device No., an interface No., a wavelength, a signal rate and a signal format or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

117.(Original) An optical switch equipment according to Claim 115, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output device No., an output interface No., a wavelength, a signal rate, a signal format, an input device No., an input interface No., or physical characteristics of optical fibers constructing the optical links as the attribute items.

Claims 118-119 (Canceled).

120.(Currently Amended) An optical switch equipment according to claim 118, connected with adjoining optical communication device, comprising:

a bi-directional in-band control channel provided in every optical links leading from output interfaces to the input interfaces of the adjoining optical communication devices, between the interfaces of the adjoining optical communication devices for the every optical links;

a control channel terminator for terminating a bi-directional in-band control channel; and

optical link controllers for administering the every optical links by exchanging control messages through the control channel terminators,

wherein the optical link controllers:

administer optical link attribute tables for specifying the attribute items of the optical links and their attribute values for the every optical links;

exchange the optical link attribute tables with one of the adjoining optical communication devices and the adjoining optical switch equipments;

compare the attribute values for the every attribute items of the optical link attribute tables;

discover the attributes of the optical links by collecting the common portions of the attribute values;

set up the optical links, of which no common portion of the attribute values has existed so that the discovery of the attributes has failed, as an error in an unusable state,

thereby to perform the state administrations for the every optical links.

121.(Original) An optical switch equipment according to Claim 120, wherein the optical link attribute tables to be administered by the optical link controllers include a device No., an interface No., a wavelength, a signal rate and a signal format or physical characteristics of optical fibers constructing the optical links as the attribute items of the optical links.

122.(Original) An optical switch equipment according to Claim 120, wherein the attributes of the optical links, which have been discovered by collecting the common portions of the attribute items of the optical link attribute tables administered by the optical link controllers, include an output device No., an output interface No., a wavelength, a signal rate, a signal format, an input device No., an input interface No., or physical characteristics of optical fibers constructing the optical links as the attribute items.